THE
VETERINARY RECORD.

The Official Journal of the National Veterinary Medical Association of Great Britain and Ireland, Limited.

FOUNDED BY WILLIAM HUNTING, F.R.C.V.S., 1888.

No. 38. SEPTEMBER 23, 1922. VOL. 2.

Hernia.

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(Presented to the National Veterinary Association, Bath, August, 1922)

When the Provisional Committee did me the honour of inviting me to present some paper for discussion at this year's meeting of the N.V.M.A. it made the suggestion that a paper on hernia would be acceptable. I was very pleased that this subject was proposed, for apart from its relieving me of the unenviable necessity of making a personal choice, it appeared that such a paper would be admirably adapted to the object in view. Herniæ are among the most important surgical conditions with which we have to deal, and are of such common occurrence in many of the domesticated animals that every practising veterinary surgeon must be thoroughly conversant with their various forms. Moreover, such widely differing surgical methods are employed with almost equal success in the treatment of each particular type that the subject should promote a good discussion and tend to an interchange of sound opinions.

I do not propose to deal with the subject in a strictly systematic and comprehensive manner, for it appeared to me after due consideration that to do so would necessitate an inordinately long paper. It is my intention, therefore, to confine myself to those conditions that are commonly met with and which we are frequently called upon to treat. To deal with rare cases of hernia presenting peculiar characters or dimensions would serve no beneficial purpose commensurate with the time occupied in describing and discussing them. It need only be said that the surgeon must decide for himself at the time of operating what modifications of the ordinary methods of treatment are necessary to cope successfully with the particular features presented by such special cases.

In a general way the term hernia means the protrusion of a part, or the whole, of a viscus out of the cavity which normally contains it. It is usual, however, for the term to be used in a more restricted sense, namely, to designate the enlargement produced by the passing of an abdominal viscus through a naturally occurring or accidentally formed opening in the abdominal wall. Various forms of nomenclature have been adopted to describe the different herniæ. They have been named both according to the region in which they occur and according to the viscus they contain. The adoption of the former method is the more common, and it is the better, in that it is simpler, and gives a clearer indication of the particular hernia referred to. The commonly occurring herniæ, and those with which I propose to deal in this paper, are umbilical, ventral, inguinal, scrotal, femoral and perineal.

For descriptive purposes a hernia may be divided into the following parts :—The hernial contents, and the hernial envelopes. The contents may consist of any part or parts of the abdominal digestive organs, uterus, bladder, or omentum. In some instances sub-peritoneal fat alone constitutes the hernial contents.

The hernial envelopes vary somewhat according to the method of origin of the lesion. In those herniæ in which the contents have been gradually protruded from the abdominal cavity the peritoneum forms the innermost envelope, or hernial sac proper. This sac is reinforced by the next layer, which is one of fibrous connective tissue. In some ventral herniæ this fibrous layer may contain the remains of the muscular tissues. Finally, external to all is the integument of the part in which the lesion exists. Among such herniæ are perineal and most of those that have occurred through a natural opening in the abdominal wall. Often, however, in cases which have arisen suddenly, as the result of some external violence, this innermost layer of peritoneum is absent. The peritoneum, tearing at the same time as rupture of the abdominal wall occurs, allows the extruded viscus to gain the subcutaneous connective tissue. In these cases, however, the connective tissue quickly forms a substitutional sac which is continuous with the peritoneum at the opening through the abdominal wall. Many ventral and false inguinal herniæ have this formation.

Occasionally, the protruded abdominal viscus is exposed to view. Complete rupture of all parts of the abdominal wall, including the skin, has occurred. To such a condition the term eventration is applied.

In a typical case the hernial sac, whether formed of peritoneum or of fibrous connective tissue, may be further described as having a body, a neck and an opening. The body lodges the main bulk of the protruded viscera, and it varies greatly in size and shape. The neck is that part of the sac which forms a passage connecting the body to the opening. It may be markedly constricted or otherwise. It may also vary considerably in length according to the depth of the tissues through which it passes. In

scrotal hernia, for example, it is very long, corresponding to the length of the inguinal canal; whereas in umbilical hernia it is very short, being limited to the thickness of the abdominal wall at the opening; and finally it may be practically non-existent, as in some ventral herniæ. The opening of the sac is the aperture at the proximal end of the neck which communicates with the abdominal cavity. It may vary considerably in size and shape.

The term hernial ring is one that is commonly employed. It is not readily applicable to all cases, and its use is practically limited to umbilical and ventral herniæ. By this term, in reality, one understands a combination of the opening, and adjacent part of the neck of the hernial sac, together with the immediately encircling lips of the abdominal wall.

Each type of hernia may be further characterised as being reducible or irreducible.

A reducible hernia is one in which the contents may, by manipulation, be returned through the hernial opening into the abdominal cavity.

An irreducible hernia is one in which reduction is prevented, either by the presence of adhesions between the hernial contents and the inner surface of the sac, or by the fact that the contents are too large to pass through the neck. The term incarcerated hernia has been applied to the latter condition.

Adhesions between the contents and sac may follow an inflammatory reaction occurring in one or both of these structures. The inflammation may be primary in those cases in which the hernia is the result of direct injury, especially if this has involved rupture of the peritoneum; or it may be set up in an already existing hernia, either as a result of an accident or of attempted treatment; and finally, it may be due to a temporary engorgement of the hernial contents.

Incarceration is often brought about by a combination of two effects: a gradual constriction of the hernial opening and a gradual increase in volume of the hernial contents. In the majority of cases the hernial opening, whether a natural or accidental one, perhaps more particularly in the latter case, has a tendency to become lessened in size. The volume of the hernial contents may increase in various ways according to the particular viscus contained. Such increase may be due to an accumulation of solid matter or of gas when bowel is involved, or of urine in the case of the bladder; in uterine herniæ it may be the result of the development of a fœtus. In those peculiar cases of umbilical hernia in the dog, in which the hernial content is sub-peritoneal adipose tissue, the gradual deposition of fat may prevent reduction.

The compression exerted by constriction of the hernial sac in the region of its neck, or by increase in the volume of the hernial contents, or by a combination of the two, may become so marked as to interfere with the circulation in the contained viscus. Unless relief from such a state is quickly obtained strangulation occurs giving rise to complete stasis, and its consequent chain of rapidly produced serious phenomena.

The sequence of events occurring in the hernial contents during strangulation is as follows:—There is at the onset venous congestion. This congestion is brought about by the compression at the neck of the hernia impeding the return flow of blood along the thin walled veins of the contained viscus. Alongside this impeded outflow there is at first no marked restriction of the inflow of blood along the arteries, because of their thicker walls and the greater pressure of the blood within them. In this way the venous congestion rapidly progresses, causing a great increase in the volume of the hernial contents, which still further intensifies the compression at the hernial opening and neck. A very vicious cycle is in progress. Stasis eventually becomes complete, and is more or less rapidly followed by necrosis of the imprisoned tissue. It is conceivable that in some instances such necrosis may be a non-bacterial one, simply resulting from arrested circulation. In the majority of instances, however, bacterial invasion of such dead tissue occurs. And, indeed, in all cases in which the strangulated viscus consists of intestine, infection takes place very rapidly and may contribute to the necrosis. For, resulting from the interference with the circulation, the natural defences of the gut wall against the hosts of bacteria ever present in the ingesta are weakened, or even destroyed, and migration of these organisms into, and across, the wall occurs, a septic peritonitis being set up.

Etiology.—The causes of hernia may be divided into two classes—predisposing causes, and determining causes. Practically all umbilical and a great majority of inguinal herniæ are in existence at birth, or occur shortly afterwards. It is highly probable that this largely explains the fact that heredity has been looked upon as a predisposing cause. Although one must admit that the progeny of some animals do appear more than usually prone to the conditions, yet closer inquiry into such cases might show, perhaps, that their origin is otherwise explainable. To illustrate this point, it may be of interest to relate a particular instance. For several years a large proportion of the colt foals born on a particular farm were found to be affected with inguinal hernia from birth. There was an inclination to blame the stallion, which was kept solely for the service of the owner's mares. The following season a travelling stallion was used, but the trouble still continued on this farm, although it did not occur in this horse's stock elsewhere in the district. It was impossible, therefore, to incriminate the stallion; and it did not appear logical to conclude that so many mares on one farm would be hereditarily predisposed. Further inquiry showed that the man in charge of the mares during foaling was in the habit of obtaining help and forcibly dragging away the foal as soon as any part of it could be seized.

During delivery by such forced traction there is a tendency for the whole abdominal contents of the foal to be squeezed into the posterior portion of the

abdomen, and especially is this the case if dilatation of the vaginal passage of the mother is not yet complete. Further, owing to the foal being in an unnaturally extended position while this great increase in the intra-abdominal pressure takes place, there is a likelihood of some of the viscera being forced through the natural openings at the umbilicus and internal inguinal ring. During delivery by propulsion, which is the natural method, exactly opposite effects are produced.

When this undue interference at the time of foaling was discontinued on the farm above-mentioned, the proportion of affected foals fell to the normal.

Again, the popularly accepted view that umbilical hernia in the pup results from interference with the umbilical cord by the bitch may be more correct than to ascribe the condition to heredity.

Any condition in which there is marked and frequently repeated increase in the intra-abdominal pressure, such as may occur in chronic cough, straining owing to chronic constipation or during attacks of diarrhœa, may be looked upon as a predisposing cause; but must, however, be regarded as a determining cause when it has actually brought about a hernia. It is, perhaps, more usual to look upon such a condition as a determining cause when it is one which gives rise to an increase of pressure of such degree and suddenness as immediately to produce a hernia.

In general, determining causes may be summarised under the headings of violent effort, concussion, and injury. As an example of the first of these, may be mentioned the act of copulation in the male, or of parturition in the female. A sudden fall may give rise to a hernia as the result of the concussion produced. An injury to a limited area of the abdominal wall may set up a hernia locally due to rupture of the muscular coat, but where the external force is more diffusely applied, its effect may be more remote, the compression causing the escape of some part of the viscera through one of the natural openings or a weakened part of the abdominal wall. In the former case it occasionally happens that not only the abdominal muscles but also the skin and the parietal peritoneum are torn, thus allowing prolapse of the viscera. Such a condition is, in reality, an eventration.

Symptoms. The symptoms of herniæ may be divided into those that are local and those that are functional.

Local symptoms are those that are displayed by the hernia itself. Herniæ vary considerably in shape and in volume according to their position, and in consistence according to the nature of their contents. The consistence may be quite elastic and fluctuating, as when intestine is present, or it may be quite firm, as in an inguinal hernia in which the uterus is contained, especially if the latter organ is gravid, in which case the outline of a fœtus may be made out. Ordinarily the swelling may be appreciably reduced in volume under the influence of sustained pressure; and sometimes it may be reduced completely. In the latter case the hernial ring can, of course, be clearly felt, but in most cases the outline and size of the hernial ring can be made out by careful digital manipulation even before reduction. There is another feature which may be looked upon as a local symptom, namely, the tendency to an increase in volume. This, however, is not constant, for apart from the fact that umbilical and inguinal herniæ occurring in young animals often tend to spontaneous resolution, there are many traumatic ventral herniæ, even those of large volume at the onset, which become greatly reduced in size, and some quite cured, without surgical interference.

In cases of uncomplicated hernia practically no functional symptoms are manifest. Functional disturbances are shown only when there is interference with the action of some vital organ of the body such as may result from a great increase in the volume of the hernia, or a varying degree of strangulation of its contents. Symptoms then shown may comprise an increase in body temperature, abnormal respiration, signs of pain, vomiting, and the adoption of an abnormal position, which will tend to relieve pressure in the region of the lesion. In addition to these functional symptoms there will be added local effects. The hernia may show marked alterations in its shape and volume. Its consistence may have become suddenly tense where formerly it was flaccid. In addition, the common local inflammatory phenomena may be present—heat, pain, and œdema.

Diagnosis. The diagnosis of herniæ is primarily based upon the detection of the characteristic symptoms mentioned above. In addition it may be stated that the position of the lesion is a factor of foremost importance. The regularity with which herniæ occur in particular positions—even in cases of ventral herniæ—demands that any circumscribed swelling situated in those parts must be dealt with as a hernia until it is proved to be otherwise. Palpation of the swelling while the animal is made to cough may aid in diagnosis. The tendency to an increase in the amount of the hernial contents during such an effort may often be clearly detected. Diagnosis is materially facilitated in those cases in which one is able to detect the particular anatomical structure which the swelling contains. To this end, palpation of the swelling may be supplemented by rectal or vaginal examination, or by the passing of a catheter or sound wherever such means are applicable. Finally, one may resort to exploratory puncture.

Treatment. Before passing on to the consideration of the treatment of each particular kind of hernia the following general statement may be made, viz., that although many herniæ become cured spontaneously, and many persist—some increasing in size—without producing any untoward effects, every hernia must be looked upon as a potential source of serious trouble. External injury, or some sudden change in the hernia itself, may determine the onset of grave consequences. It is therefore impossible to draw a clearly defined line between those cases that need no treatment and those cases that must receive some treatment, which will vary

in its drasticity, partly according to the lesion to be treated, and partly according to the will or ideas of the surgeon into whose hands it is entrusted.

Treatment aims at closure of the hernial opening. Such closure may be obtained directly or indirectly. Directly, when radical operations are performed in which closure of the hernial opening is effected by sutures or other means. Indirectly, when methods are employed by which it is hoped to maintain the hernia in a more or less reduced condition, and so allow the opening to become constricted, and later, obliterated. Direct closure is the almost invariable procedure in small animals. In large animals the nature and extent of the lesion govern the choice of method to be adopted.

It will save repetition if some brief general remarks are here made in reference to the preliminary preparation, restraint and after treatment of an affected animal. The animal should be fasted for from 12 to 24 hours immediately prior to the time of operating, and in those cases in which a radical operation is to be performed it should have been fed for several days on a restricted, non-bulky, nutritious diet, so as to lessen as much as possible the tension on the abdominal wall. All superfluous hair should be removed from the site of operation and the immediately surrounding area. This is best carried out before the animal is secured. The animal must be fixed in a dorsal position, except in cases of perineal hernia and those situated high up the flank. Horses are best secured as for rig operation, namely, with the hind legs fixed backwards, well flexed and apart. Dogs and small animals are placed on their backs on an operating table and secured by their legs in the usual manner. For radical operations the skin should be shaved and disinfected by painting with tincture of iodine immediately before operating.

Sterilised towels should be secured around the operation area to prevent accidental contamination of the operator's hands, instruments and suture material. For small animals a piece of linen or calico, in the centre of which a round or oval opening has been cut, and which has been boiled along with the instruments, answers admirably. It should be so secured as to expose only the operation area. The hind feet of horses should be covered to prevent particles of dirt falling from them to contaminate the wound.

A general anæsthetic should always be employed. It is customary, however, to perform the simple operations for the treatment of small umbilical herniæ in foals without an anæsthetic, but even in such cases its use aids in the control of the animal and the performance of the operation. In all other operations a general anæsthetic is almost a necessity to ensure success. As a rule no particular after-treatment is indicated other than observing general hygienic principles, including suitable feeding.

Umbilical Hernia.

Umbilical hernia is a condition that occurs essentially in the young animal. It is common in foals and puppies, and, compared with these, is comparatively rare in the young of the other domesticated animals. It may be in existence at birth, when it is usually styled congenital, or it occurs shortly after birth, when it is said to be acquired. Rarely does it arise during adult life. In the congenital form it may be that during intra-uterine development the umbilical ring which gives passage to the umbilical cord has not become sufficiently constricted to prevent the passage of some abdominal viscus through it when the animal assumes a standing position after birth. On the other hand, it may be that the passage of some abdominal viscus through the ring alongside the cord during uterine life has prevented the normal closure of the umbilical ring. In some cases the hernial opening is of such dimensions that there would appear to have been an actual arrest of the embryonic development of the abdominal wall. Such a condition, although not very common, occurs more frequently in the dog than any other animal, especially in the small toy breeds, of which Pekinese are most often affected.

The acquired form may arise during any maintained or sudden compression of the abdominal contents, such as may be caused by a fall, by jumping about at play, or by contraction of the abdominal muscles while straining during an attack of diarrhœa or constipation. Excessive dragging on the umbilical cord may allow pouching of the peritoneum from the inside, and so lead to the formation of a hernia. The hernial contents generally consist of intestine and omentum, or either of these alone.

As a rule there is no great difficulty in forming a correct diagnosis, based upon the occurrence at the umbilicus of an enlargement displaying those symptoms which have already been described for the general diagnosis of herniæ. The volume is more or less directly proportional to the size of the hernial opening, which, as already stated, may vary considerably. In those cases occurring in the dog in which there is an incomplete development of the abdominal wall the volume of the hernia may be very great, and the contents in such cases may form a comparatively large proportion of the whole of the abdominal viscera. It is necessary to differentiate from umbilical hernia a chronic thickening of the remnants of the umbilical cord, and occasionally an infected condition of the cord. The former is evidenced by its being irreducible, and by no hernial ring being palpable. It has a firm, hard consistence and is never of any very great size. The distinguishing feature of the latter is that it is inelastic, and it exhibits inflammatory phenomena—heat, swelling, and some pain on pressure—which would only be present in a case of hernia if strangulation had occurred. The latter is a most rare occurrence in umbilical hernia, but if there is any doubt, exploratory puncture may be practised.

Treatment in the Horse. The methods adopted in dealing with umbilical hernia of ordinary size in the horse are more numerous, and the precise manner in which they are applied shows greater variation than is the case in the treatment of any other hernia. They range from the use of some form of truss, or the

application of a chemical or thermal irritant, to the more definite obliteration of the sac by ligation or the use of a clamp. All these means are more or less equally successful in curing those cases in which the hernia is small, varying in size from that of a hen's egg up to that of a man's fist. One or other of them may find particular favour with a practitioner because he has found it successful and become used to its application. I do not propose to discuss all these methods in detail, but in referring to them it is hoped that the particular advantages or disadvantages of each will be brought out in the discussion by those who are familiar with them.

Many cases of hernia become cured spontaneously during the first year of the animal's life. One may safely make the assertion, based upon this fact, that many more would become cured if ever so slight treatment were given to aid this natural tendency to repair, and this explains the success of the various simple palliative measures.

Many forms of trusses are in use. The essential feature of a truss, in order that it may be effective, is its *fit*. The " fit " should be such that the truss will maintain an exact position on the hernia without exerting undue pressure, which is certain to give rise to chafing, and possibly to sloughing of the skin. There is a tendency for chafing to occur, even with the most perfectly fitting truss, when it is first applied. This tendency is aggravated by the fact that the truss is usually worn in summer-time. This, and the inconvenience the wearing of the truss occasions to some animals, may cause a degree of unthriftiness in them. A further disadvantage is the necessity for making, or adapting, a truss for each individual animal.

Among the irritants used in the treatment of umbilical hernia may be mentioned the various blister ointments which are applied in the ordinary manner. Some prefer the more actively corrosive mineral acids, nitric or sulphuric. These must always be used sparingly and with care, otherwise they cause excessive sloughing of the skin and adjacent tissues before the hernial opening has become obliterated, and may thus result in prolapse of the intestine. Having removed the hair from the skin, it is best to take a glass rod and apply the acid in a series of dots not less than one inch apart. Starting from the centre of the swelling, one may advance over its whole area by successive concentric rings of dots. The actual cautery and the subcutaneous injection of 15 per cent. sodium chloride or 10 per cent. zinc chloride in water are other means that have been used to produce the necessary irritation. All these methods depend for their success upon the inflammatory reaction which they set up in the skin and subcutaneous tissues resulting in swelling, which increases the pressure on the outside of the hernial sac, and so tends to bring about the return of the hernial contents into the abdomen, thus allowing constriction and finally obliteration of the hernial opening to take place—a process which is aided and hastened by extension of the inflammation to the edges of the ring itself. The inflammatory reaction varies in intensity according to the particular irritant used; it is most marked following the application of the strong mineral acids, as is the subsequent contraction of the skin.

Such methods as these can only be employed with success in the treatment of simple herniæ of small size in which the natural tendency to resolution requires but slight assistance in order to become effective. They must be regarded, therefore, as of the " hit or miss" type of surgery, and more certain results may be obtained in a shorter time by the adoption of measures calculated to bring about direct obliteration of the hernial sac. This may be effected satisfactorily by the use of a ligature or clamp, and, for the sake of convenience, the steps to be taken in applying these may be described simultaneously. As a rule, the animal should be put on a somewhat restricted, non-bulky diet for several days before the operation, although in very young subjects a short preliminary fasting would appear to be all that is necessary. Some practitioners perform the operation quite successfully whilst the animal is standing, but it is preferable to cast and secure it in the dorsal position. It is not customary to employ an anæsthetic, although the use of one assists considerably in controlling the animal and renders easier the application of the ligature or clamp. The hair should be removed from the whole of the skin overlying the hernia and the surface disinfected by painting with tincture of iodine. Such disinfection will in part control the suppuration in, and consequently the rate of separation of, the skin at the line of compression by the ligature or clamp. After reduction of the hernial contents has been effected, traction is exerted on the sac and overlying skin, and the ligature or clamp is then applied to their base close up to the level of the abdominal wall. It is finally tightened after care has been taken to ascertain that no part of the viscera is included in it. The skin and sac may then be transfixed by a long metal pin placed just externally to the ligature or clamp, in order to prevent it from slipping. More than one pin may be used, and occasionally two are placed crosswise to one another. Some operators prefer to place the pins in position before putting on the ligature or clamp, and this order of procedure is almost a necessity in applying a ligature while the animal is standing. The ligature material may be either cord or elastic. The former should be applied as a clove hitch, the ends being left fairly long and free in order that it may be re-tightened in two or three days' time. Plaited whipcord is quite good for the purpose. Some apply ordinary biniodide of mercury blister over the region of the ligature. This application, in addition to producing an inflammatory swelling, tends to check premature or excessive suppuration by rendering the area aseptic. If an elastic ligature is employed, this should not be tied too tightly at the time of application, or separation of the skin and sac may take place too early, allowing prolapse to occur. The best type of clamp is a light steel one made with an adjusting screw at either end. A uniform pressure can be applied to the whole width of the sac with one of this pattern; and further, the

pressure may be maintained during sloughing of the sac by subsequent tightening of the screws. The clamp should be of sufficient strength to prevent warping or wringing of its separate jaws, otherwise the pressure exerted upon the included tissues may be so uneven that the circulation is not entirely cut off in some places and complete separation will not take place. The clamp should be applied in a direction corresponding to that of the long axis of the body; and it may be supported by strong tapes or bandages fixed at either end and tied over the animal's back.

No particular local treatment is afterwards necessary. The animal should be placed under good hygienic conditions, and for a time should be allowed only a limited amount of non-bulky food. The sac and overlying skin included in the ligature or clamp usually becomes detached in from a week to ten days' time, leaving a raw, rather extensive, granulating wound, to which may be applied some antiseptic dry dressing. Cicatrisation takes place fairly rapidly.

In those cases of umbilical hernia in which there are adhesions present, or in which the hernial opening is large and the swelling correspondingly voluminous, more precise steps have to be taken to ensure a successful result. The hernial sac must be laid open, and since by this action a direct path is made into the peritoneal cavity, the strictest aseptic precautions must be observed. The animal should be placed on a restricted non-bulky but nutritious diet for several days beforehand, and fasted for 24 hours immediately preceding the operation. It must be cast, anæsthetised, and secured in the dorsal position in a manner similar to that adopted for rig operations, namely, with the hind legs fixed backwards, well flexed, and apart. The hair should be removed from the site of operation, which should then be disinfected by painting with tincture of iodine. An incision two or three inches long should be made through the skin and subcutaneous tissue, from before, backwards, and slightly to one side of the median line. The underlying hernial sac must then be incised carefully and sufficiently to admit readily one or two fingers. Any adhesions must be cautiously broken down and the hernial contents returned to the abdomen. Should the hernia be of comparatively small size, it may be dealt with by transfixing the skin and hernial sac with a pin close up to the level of the abdominal wall, guiding its insertion with a finger introduced through the incision, and then applying a ligature or clamp in a manner similar to that already described. The edges of the wound are afterwards drawn together with closely placed sutures. In cases where the hernial opening is too large to allow of this procedure Degive's method, or a modification of it, should be followed. This method, as originally described, consists in opening the sac and reducing the contents, after which two strong slightly curved needles are placed in position, one at the anterior and the other at the posterior part of the hernial opening. They are so inserted as not only to transfix the skin and hernial sac, but also to pass through the opposing edges of the hernial ring, *i.e.*, through the abdominal wall itself. A clamp is applied on the proximal side of these needles, so that when its jaws are closed the inner serous surfaces of the opposite sides of the hernial ring are brought together. After the jaws of the clamp have been tightly secured, the needles are removed and pins inserted in their place, in order to prevent any displacement of the clamp. It has been claimed that this method is most successful, but it has the disadvantage, however, that in those cases in which it fails and allows a recurrence of the hernia, the latter is very much increased in size. This increase is due to the fact that the part of the abdominal wall which forms the lips of the hernial ring is used up and destroyed by the effect of the clamp, so that, in case of recurrence, the hernial opening is bigger than before the operation.

In the small percentage of cases of large umbilical hernia, which, owing to their size, cannot be dealt with by any of the foregoing methods, the so-called radical operation may be attempted. All umbilical herniæ may be treated in this way, which in some cases is the only one that is likely to give good results. It is the method commonly adopted in treating this condition in the small animals. The operation will be described later in dealing with these, since the details are precisely the same for all. It is a method that is not commonly adopted in the large animals, because in them favourable results cannot be guaranteed with the same degree of certainty as in the smaller ones. The unfavourable environment under which one generally has to operate upon the former, and the greater strain put upon the wound by the more weighty abdominal viscera when the animal resumes a normal position after the operation, are disadvantages with which one does not have to contend in the latter. There is no reason, however, provided all the necessary precautions are taken, why it should not be more frequently practised. Its adoption would, without doubt, be followed by quicker and more certain cures.

Treatment in the Dog. In all cases of umbilical hernia in the dog, except those in which the great size of the opening would appear to have resulted from an insufficient or an arrested development of the abdominal wall, the hernial opening tends to constrict and the hernia to become smaller. This constriction progresses until the contents, which consist of either omentum or sub-peritoneal fat, can no longer be reduced. The opening may become so small as to cause strangulation and subsequent necrosis of the imprisoned fat; so small, in fact, that only the thinnest of metal probes can be passed through it. Rarely does the opening become completely obliterated spontaneously so long as there is any serous membrane external to the abdominal cavity. As regards treatment, it may be mentioned that if a very small hernia be frequently reduced and so maintained for a period of time, by digital manipulation, gradual constriction of the hernial ring is permitted, and a cure may thus be effected. Neither the application of a bandage and compress, nor the use of plasters or charges, is very

effective. An adhesive plaster bandage completely encircling the body may exert some beneficial effect. The marked looseness of the dog's skin, however, militates against the success of such methods. The simplest and best plan is to proceed directly with the radical operation.

The animal should be thoroughly anæsthetised and secured in the dorsal position. Rigid asepsis of the operator's hands and all instruments and material used in connection with the operation must be practised. The hair should be shaved over the whole neighbourhood of the operation area, and the latter disinfected by painting with tincture of iodine. An elliptical incision through the skin is made over the whole length of the swelling, so as to include the umbilical cicatrix. The latter point is most important. For, owing to adhesion between the sac and overlying skin which is always present at this point, any attempt at separation of the two will lead to incision or tearing of the sac. The remainder of the peritoneal sac should be completely freed from the skin and abdominal wall right up to the margin of the hernial opening. The sac in umbilical hernia in the dog consists of a very fine, delicate membrane of peritoneum. Separation of it is aided by an assistant exerting careful traction by means of two loops of suture material inserted through the fore and hind parts of the circumcised piece of skin, by using a very sharp scalpel where necessary, and by adopting blunt dissection where possible. When the sac has been completely freed, reduction of its contents is carried out by twisting it up with a pair of artery forceps fixed to its distal end. A ligature is then applied to the neck close to the hernial ring and the part of the sac external to the ligature removed. In those cases in which the hernial contents consist of a piece of incarcerated omentum or sub-peritoneal fat, and the opening is so small that reduction cannot be accomplished, a ligature may be similarly applied and the sac and included fat excised. In the majority of cases such ligaturing of the neck of the hernial sac will be sufficient to bring about obliteration of the hernial opening, but in those cases in which the opening is large the stump of the excised sac should be pressed into the abdominal cavity and one or more sutures placed in Lembert fashion through the lips of the hernial ring external to the peritoneum. When the hernial opening is long and wide, the sac may have to be dealt with by multiple ligation, and all sutures through the edges of the hernial ring placed in position before tying any of them. The tying should proceed alternately from either end of the opening towards the centre. The edges of the skin wound must then be brought together by interrupted fine silk sutures, and the operation area, especially the sutures, painted with tincture of iodine. When the latter has evaporated compound tincture of benzoin should be applied. A compress of sterile gauze and cotton wool may be placed over the wound and held in position by a jacket bandage tied at the back. Such bandaging, however, is by no means essential to ensure primary healing if strict aseptic percautions are observed, and in the male dog may even hinder the process, unless it is so arranged as to prevent soiling of it during urination.

This radical operation may be performed in the large anmials in precisely the same manner. A dry sterile compress and bandage should always be applied in their case. The bandage, too, should be made of stout material and applied tightly in order that it may provide support to the abdominal wall as well as protection to the wound.

Ventral Hernia.

Under this heading are grouped all abdominal herniæ other than those that have received a definite designation owing to their particular anatomical position. They occur most commonly, perhaps, in the region of the flank, either high up just behind the ribs or low down just above and to the inner side of the stifle. They are, almost invariably, accidental in origin, resulting from bruising and tearing of the muscular tunics by the impact of some blunt body on the abdominal wall. In the horse they are often caused by the animal getting lodged across a fence or the heelpost of a low partition. Kicks and similar injuries may also be a cause.

Ventral herniæ vary considerably in size. Small ones may exist without ever giving rise to any serious symptoms or even inconvenience, but others may be so large as to render the animal unserviceable, and surgical interference may be difficult or even impossible.

The condition is not likely to be mistaken for any other, if one bears in mind the common symptoms and differential diagnosis of herniæ in general. It is, however, often difficult to establish the existence of a hernia immediately following one of the accidents referred to above, as there may be extensive contusion and bruising of the abdominal wall as a result of the animal having been hung up on a post or fence. In such cases, owing to the depth and extent of the cellulitis and œdema that quickly occurs in the injured tissues, it is difficult, and sometimes impossible, to make out a hernial opening. In some of these cases there are multiple ruptures in the muscular tissues and peritoneum, and in consequence of the tearing there is considerable hæmorrhage, which is largely responsible for the great amount of cellulitis that rapidly occurs. This gives rise a little later to localised accumulation of fluid, which further complicates diagnosis. Examination per rectum affords, perhaps, the only reliable means of coming to a definite conclusion.

Surgical treatment of ventral hernia in the dog and of old-standing lesions in the horse follows precisely the same lines as that laid down for the radical treatment of umbilical hernia. No method that does not include direct closure of the hernial opening at the time of operating is likely to be successful. Something must be said, however, in connection with the treatment that should be adopted immediately after the occurrence in the horse of that particular type of ventral hernia referred to above. Radical surgical interference is contra-indicated in such cases unless symptoms of strangu-

lation or some other serious lesion of the bowel are shown. The amount of swelling and hæmorrhage, and the bruising and often multiple tearing of the tissues of the abdominal wall all render an operation very difficult to carry out. And, further, the overlying skin is often in such a bruised and infected condition as to make an aseptic operation almost an impossibility. The risks of operation are, therefore, greatly increased, because the tissues in their damaged condition are unable to resist any chance infection. Experience gained during the war, when this class of accident was common, has shown that good results may be obtained and in the majority of cases a complete cure effected by placing the animal in a suitable position, putting it on a very restricted diet, and applying such treatment as may be necessary to the surface contusion. The animal should be placed in a stall just sufficiently wide to accommodate it, and the floor should be so made that the fore feet will be at a level of about 20 inches below the hind feet. It should be fed on a small ration of practically clear corn only, the quantity being increased in strict accord with the lessening in size of the hernia.

Mullie[1] aptly calls this the physico-physiological treatment of ventral hernia. Even in the event of a complete cure not being obtained, the tissues will have returned to a more normal healthy condition, and the hernial ring will be more clearly defined, so making an operation more easy to perform, and more likely to be successful.

Inguinal Hernia.

Under this heading, too, may be included scrotal hernia. In reality they are one and the same condition, the only distinction being that in the latter sufficient of the herniated viscus has escaped down the inguinal canal for it to reach the scrotum. In fact, in the male the sac which envelopes the herniated viscus is not a true hernial sac in the sense that it has been formed simultaneously with the hernia, but is a naturally occurring diverticulum of the peritoneum. And it is owing to this fact that there is a tendency, an inducement one might almost say, for an inguinal hernia to develop into a scrotal hernia.

By inguinal hernia one understands the passage down the inguinal canal of some of the abdominal viscera. The condition is by no means uncommon in the horse, but less common in the dog ; and whereas it is rare in the mare it is quite common in the bitch. In the male of both species it is usually congenital, in that it is noticed at birth or shortly afterwards, more particularly in the coarser breeds of horses and in the toy breeds of dogs. There is much greater tendency for spontaneous recovery to take place in the former species during the first year of the animal's life, than in the latter. When inguinal hernia occurs in the adult horse, it is almost always the result of some sudden effort, such as may take place when rolling during an attack of colic, when cast for an operation, or during the act of copulation. In the last of these the opened character of the groin, the erect position of the animal, and the increased pressure on the abdomen all favour its formation. The majority of these cases demand immediate surgical interference as early strangulation very frequently follows.

The development of inguinal hernia in the bitch, as a rule, takes place gradually. In some cases there is no very apparent cause, in others chronic constipation, or chronic cough, may be the deciding factor. In these animals, however, the anatomical disposition of the round ligament of the uterus which descends through the inguinal canal and passes backwards to the perineal region to end in the tissues at the side of the vulva is no doubt a predisposing influence. This anatomical arrangement, too, explains the almost invariable presence of the uterus in the hernia. Inguinal hernia in the bitch tends to become progressively larger, and may assume enormous dimensions, and contain, in addition to the uterus, much of the small intestine and omentum. Strangulation, however, rarely occurs ; the animal appears to suffer no inconvenience whatever, and remains in normal health. In the horse the contents generally consist of a loop of small intestine or omentum, or both. In some foals the hernia is very large, and occasionally strangulation occurs, necessitating an immediate operation. In other cases partial strangulation or engorgement may occur at intervals, giving rise to the exhibition of varying degrees of discomfort and pain, which can be relieved by reduction of the hernia. These attacks as a rule become less frequent and less severe as the animal develops. As already stated, there is a great tendency for inguinal hernia in the foal to disappear spontaneously during the first, and even during the second year of life. The possibility, however, of its still being in existence, although not visible, must not be ignored, otherwise an unfortunate result may be experienced. In those cases in which digital examination of the inguinal region has failed to confirm or disprove the existence of an inguinal hernia, rectal examination will enable a definite diagnosis to be made. If the condition is present after one year, it is more likely to become chronic and show a tendency to increase in size.

Treatment in the Horse. In the young animal it is inadvisable to interfere for about the first eighteen months of life, unless an operation is indicated by repeated attacks of colic or by the onset of symptoms of strangulation. For, apart from the tendency towards complete or partial recovery that may be exhibited during this time, the tissues upon which one has to rely for effecting a cure become further developed and stronger ; the operation is rendered easier, and a more definite cure obtained.

The operation is carried out on the animal secured in the dorsal position and placed under a general anæsthetic ; the scrotum and inguinal region are disinfected with iodine, and all aseptic and antiseptic precautions in connection with instruments and the operator's hands are observed. Spontaneous reduction often occurs owing to the position of the animal and to the effects of the anæsthetic. The testicle

(1) Mullie, G. Rec. Med. Vet., Vol. xcii., No. 19, 15th October, 1917, pp. 541-546.

on the affected side should, if possible, be secured before this has occurred, as its presence materially facilitates the incision of the scrotum and exposure of the subjacent tissues. If it has already accompanied the hernial contents into the abdomen, careful palpation of the inguinal region, combined with rolling the animal quietly from side to side, will often succeed in returning it to the scrotum. Should these attempts fail, however, an assistant, by inserting his hand into the rectum, will be able to locate it and direct it into the inguinal canal. When the testicle has been secured, reduction of the hernia should be effected in cases in which it has not already taken place. This is, as a rule, easy, for adhesions are by no means common. Should they be present, they will have to be dealt with by opening the tunics at a later stage of the operation. Incision of the scrotum is best done as follows :—The right hand grasps the testicle, covered by the scrotum, and elevates it to the fullest extent. The scrotum and the enclosed spermatic cord are seized below the testicle by the left hand, which, by a squeezing action, makes tense the scrotum over the testicle. This squeezing action is carefully maintained whilst the scrotal integument *only* is incised to the length of four or five inches, in a direction from the inguinal region backwards and inwards to the median raphé. A succession of short, shallow incisions next effects the division of the dartos to a corresponding extent. The incising is carried to such a depth that the testicle, with its coverings, commences to bulge readily between the separating edges of the wound under the squeezing effect of the left hand. Such bulging affords a better guide as to the limit to which the incisions should be carried than any attempt to decide this point anatomically. For, owing to the fineness of their structure and the closeness with which they are applied to one another, it is very difficult to differentiate the various fasciæ forming the testicular sheath. Further enucleation of the testicle in its coverings is carried out by the thumb and fingers of the right and left hands successively, by which means not only is the danger of opening the coverings averted, but hæmorrhage is entirely prevented or reduced to a minimum. The knife, however, is employed to sever the attachment formed by the scrotal ligament running from the posterio-inferior extremity of the tunic towards the perineal region. Liberation of the vaginal sac is effected as high up towards the external inguinal ring as possible, and the testicle in its sheath, held high by the right hand, is given one complete twist, after the final reduction of any prolapsed viscus. This not only precludes the possibility of further descent during the completion of the operation, but subsequently assists in retention of the hernial contents. A stout wooden clamp is next applied to the twisted cord and tunics from five to six inches above the testicle. The clamp is gently closed by forceps and secured with strong cord by the usual method.

The possibility of tearing of the vaginal sac or cord, with subsequent escape of intestine, due to strain when the abdominal wall resumes its normal position as the animal regains its feet, renders it inadvisable to fix the clamp as high as possible upon the cord. Even if such an accident does not occur following high clamp fixation, there is a likelihood of skin necrosis from clamp pressure, with subsequent granulation and aggravation of the local inflammatory swelling.

If the testicle is large and likely to drag unduly on the cord, it should be removed with the ecraseur after the clamp has been securely adjusted ; for the purpose, an incision sufficiently large to liberate the testicle is made through the tunics, and afterwards is closely sutured in case displacement of the clamp should occur.

In those cases in which reduction cannot be accomplished on account of adhesions, the sac containing the testicle and herniated contents is exposed and liberated as described above. At the uppermost extremity of the sac an incision is carefully made sufficiently large to admit a finger, with which the adhesions are cautiously broken down and the hernia reduced if possible. If this cannot be effected, the incision must be enlarged to facilitate complete separation of the adhesions and reduction of the contents. Any incision so made should be sutured before proceeding with the operation, because by so doing a better purchase on the sac is obtained, and the operation is completed as though no incision had been necessary. Infection of the vaginal sac, with consequent peritonitis, must, of course, be carefully avoided. In hernia of exceptional size the clamp may be placed within the scrotal wound, and the lips of this brought together with sutures or another clamp, which should be removed in two or three days' time if satisfactory progress is made.

A ligature is sometimes applied to the cord and sac in place of a clamp. There are objections, however, to this method. It does not afford so much support in the inguinal region, but is withdrawn higher up the canal, where, after becoming infected, it may become embedded, giving rise to deep-seated suppuration until it is removed. Such suppuration may extend to the peritoneal cavity ; and this is favoured by the method, commonly adopted, of transfixing the cord and sac at the point of application of the ligature in order to prevent its displacement.

The animal should be reclining on the side of the previously existing hernia when released, and should be well recovered from anæsthesia before being allowed to rise. It should afterwards be tied up in a clean stable and placed on a restricted and light diet for a few days, when, if progress is satisfactory, it may be released and allowed more food. The scrotal wound does not lend itself to any effective cleansing and disinfection, but this apparently is not necessary, and nothing need be attempted beyond spraying it with some mild antiseptic if considered desirable.

Operation in the Bitch. An incision about 1½ inches long is made directly over the external inguinal ring, parallel to the line of junction of the thigh with

the body. The skin and subcutaneous tissue are severed so as to expose the hernial sac, care being taken not to puncture the latter. It will be found more easy to make a correct incision if the contents are still present than if their reduction has taken place. The sac is then withdrawn through the external wound, practically no dissection, blunt or otherwise, being necessary. There is consequently no bruising of the parts, and, since no blood vessels pass from the sac to the surrounding tissues, there is no hæmorrhage. These two facts have a considerable bearing on the subsequent healing of the wound. It will be noticed that the fundus of the sac pouches backwards, and that from its extreme posterior limit a fine cordiform attachment runs into the perineal region. This cord is in reality the round ligament of the uterus which normally passes down through the inguinal canal and then backwards to end in the tissue at the side of the vulva. It should be divided by a knife or pair of scissors, and the sac completely freed right up to the inguinal ring. Reduction is next attempted, and, provided there are no adhesions between the contents and sac, and a gravid horn of the uterus is not present, this is, as a rule, easily accomplished. The best procedure is to grasp the free end of the sac with a pair of artery forceps, and gradually twist it up by gently rotating these, meanwhile exercising careful digital manipulation of the contents so as to press them gradually into the inguinal canal. An even pressure is thus exerted upon the contents as reduction proceeds. When this is complete, and while the sac is still twisted up, a ligature is applied close up to the inguinal canal, care being taken not to include in it any part of a large vein which passes out of the postero-internal corner of the ring. In the majority of cases such ligation is sufficient to effect a permanent cure, but where the hernia has been long-standing and has become very large, it may be found that the inguinal ring has become so dilated that transverse suture of it is necessary; where this is intended the sutures should be placed in position immediately after ligation of the sac, and before its removal, for, by gently pulling on it, the margins of the inguinal ring are brought plainly into view and sutures can be very easily inserted. Two of these placed across the inguinal ring, one on each side of the ligatured sac, will be sufficient. The peritoneal sac is now removed close up to the ligature, and the two transverse sutures tied, bringing the edges of the inguinal ring together over the stump of the ligatured sac. The edges of the external wound are brought together with closely, placed fine silk sutures. Since there is practically no tension on the skin of the groin, the finest silk and needles should be used, for by so doing the chance of subsequent infection by way of the sutures is reduced to a minimum. There is one other exceedingly important precaution that should be observed, for it, too, considerably influences the early healing of the wound. When the edges of the skin have been brought together the subcutaneous space previously occupied by the hernia will be filled by a quantity of air. Any air so included will, by keeping the opposing surfaces apart, prevent early adhesion and encourage oozing into the space from small severed blood vessels and lymphatics, thus increasing the subsequent swelling. This air can be best expelled by inserting a grooved director through the edges of the wound between two of the central sutures, and while this is in position, carefully pressing the skin up into the groin by two small pads of cotton wool, one on either side of the director. When this has been done the director is withdrawn and the pressure removed. It will then be noticed that the atmospheric pressure will maintain the skin in close proximity to the underlying structures. The wound and sutures are painted with tincture of iodine, which is allowed to evaporate, after which compound tincture of benzoin is applied. No compress or bandage should be used. A variable amount of cellulitis generally occurs during the next two days, but it is not accompanied by any systemic disturbance, nor by any marked local inflammatory phenomena, and calls for no special treatment. A reliable guide that progress is satisfactory is dryness of the sutures and of the wound itself. If no infection has occurred, the swelling will commence to subside from the third or fourth day, and the sutures may be removed in five or six days' time.

Operation in the Dog. The method of operating varies slightly according to whether the conservation of the testicle on the affected side is to be attempted or not. The seat of operating is the same in either case. After observing all the necessary preliminary precautions, and reducing the hernia, a small incision about three-quarters of an inch long is made directly over the external inguinal ring, exposing the sac as it emerges from the canal. The neck of the sac is freed from the surrounding tissues, and if an effort is to be made to preserve the testicle, a suture is so placed through the antero-external part of the sac, close to the inguinal ring, so as to diminish the lumen at this part sufficiently to prevent the descent of any viscera and at the same time not interfere with the blood supply of the testicle. The happy medium between these two desiderata cannot be struck with any degree of certainty. A more definite cure can always be obtained if the testicle is sacrificed. The neck of the sac is laid bare and freed as above, and the remainder of it with the included testicle is pulled from the scrotum through the skin wound. A ligature is then placed round the entire neck close to the inguinal ring, care being taken to ensure that the hernia is completely reduced beforehand. The sac and spermatic cord are then severed close to the ligature. The small external wound is closely sutured, all air being carefully expelled from the cavity which has been formed in the scrotum by extraction of the testicle and its tunics. If the operation has been performed aseptically, and the skin wound remains dry, no steps need be taken to deal with the œdema, and in some cases the accumulation of fluid, that takes place in the scrotum.

It may here be mentioned that castration of young boar pigs suffering from inguinal or scrotal hernia may be carried out in precisely the same manner, although it is more customary, perhaps, simply to remove the testicles by the ordinary method and then suture the skin incisions.

Strangulated Inguinal Hernia. Inguinal herniæ are more prone to strangulation than any other type, especially when they occur in the adult as the result of an accident, and even more particularly is this the case in the entire horse. Immediate interference is necessary. The animal should be secured in the dorsal position and brought to a state of deep anæsthesia, as the latter materially assists in bringing about reduction. If treatment is commenced sufficiently early after the onset of symptoms as to preclude the likelihood of serious pathological changes having occurred in the strangulated contents, reduction by local manipulation without incision may be attempted, and this may be aided by taxis per rectum. Should it be successfully accomplished, no further steps may be necessary other than adopting the physico-physiological treatment referred to for ventral hernia. No time, however, should be lost in attempts to bring about reduction if this proves to be difficult; for the pathological changes which quickly occur in the strangulated viscera will be aggravated by prolonged manipulation. It is far better to open up the scrotum and sac without delay so that herniotomy—enlargement of the hernial opening—may be carried out. When, in the case of an entire horse, it is particularly desired to save the testicle, an operation, following as closely as possible the lines of that described for inguinal hernia in the dog, may be attempted, accompanied of course by herniotomy. To carry out the latter, a small incision is made in the neck of the sac, close to the external inguinal ring, and a herniotome is guided and guarded by a finger inserted through this incision up the canal as far as the inner ring, or point of strangulation, which is then cautiously cut in a forward and outward direction. A very limited incision of the ring will usually release the strangulated organs and allow reduction. The opening into the sac is then sutured, the sutures being placed sufficiently deeply in the wall of the sac to diminish the lumen of its neck and prevent re-descent of the viscera.

In all other cases the scrotum must be freely incised and the hernial sac separated from the surrounding tissues up to the external inguinal ring. The sac is then opened carefully and sufficiently to allow of free examination and handling of its contents. If these appear to be in a fit state to be returned to the abdomen, herniotomy is performed and reduction effected. Should, however, the contents show signs of necrosis re-section of the affected part, either omentum or bowel, must be carried out before reduction. Re-section of omentum is a simple matter and easily accomplished, the large vessels in it being the only parts requiring ligature. On the other hand, re-section of bowel is difficult and dangerous, especially in large animals. It is equally certain, however, that it offers the only chance of saving the animal's life when the strangulated bowel has become definitely necrotic. If it is performed, every effort must be made to avoid contamination by infective material escaping from the severed intestine. The serous surfaces of the divided ends must be brought into apposition by means of closely placed Lembert sutures. The united bowel should then be carefully washed with warm sterile normal saline solution before being returned to the abdominal cavity.

The final stage in the operation—closure of the sac—is accomplished in the same manner as in uncomplicated inguinal hernia, viz., by applying a ligature in small animals and a clamp in large. After treatment is on the usual lines.

False Inguinal Hernia. This, in reality, is a ventral hernia. The rupture in the abdominal wall, however, through which it occurs is situated so closely in front of the internal inguinal ring that the prolapsed viscera passes down the inguinal canal, but outside of the tunica vaginalis, and although reaching the inguinal region does not descend to the bottom of the scrotum. It is a comparatively rare condition. Reduction may be attempted by means of local manipulation and rectal taxis combined. If this does not succeed and strangulation has occurred, operative measures, following more closely those described for dealing with ventral rather than with inguinal herniæ, must be undertaken. The author has observed during the last eighteen months two cases in dogs—both of which resulted from the animal being run over—successfully cured by a radical operation.

Crural Hernia.

This is a very rare condition, but it has been observed in the horse. It consists of some part of the abdominal viscera protruded through the crural canal or arch, which is bounded by the sartorius and iliacus muscles and Poupart's ligament. It occurs as a swelling situated high up on the inner aspect of the thigh. The treatment that has been advised consists of suturing Poupart's ligament to the sartorius muscle after incision of the skin and reduction of the hernia. This should be followed by tying up the animal for two or three weeks in a restricted space with the fore-feet at a much lower level than the hind.

Perineal Hernia.

This type of hernia is most common in dogs. It occurs as a swelling showing hernial symptoms, and situated slightly to one side and below the anus. Straining during parturition, and as the result of chronic constipation, or, in the old dog, of an enlarged prostate, is a predisposing cause; standing with the hind legs downhill has also been said to favour its occurrence in cows. The bladder commonly forms part of the contents. Reduction is, as a rule, easy, and is aided by raising the hind parts. The reducibility of the swelling assists in differentiating the condition from tumour formation, and diagnosis may be confirmed if necessary by exploratory puncture.

Treatment in the Dog. The animal should be secured in the abdominal position and anæsthetised. The skin is incised after careful cleansing and disinfection, and the peritoneal sac is freed from the surrounding tissues. Reduction of the hernia is effected and the sac ligatured close in and then removed. The stump is pushed towards the pelvic cavity and deep supporting sutures inserted if possible, after which the skin wound is also closed. After the operation an attempt should be made to remove those conditions which appear to have been the predisposing factors in the particular case.

In conclusion, it may be remarked, that, although no very definite reference has been made to herniæ in cattle and cats, the treatment of the various types in these animals is almost identical with that laid down for horses and dogs respectively.

Discussion.

The discussion was opened by Major F. T. Hobday, C.M.G., F.R.C.V.S., F.R.S.E., who said:—Professor Reynolds has placed before you in a very lucid and instructive manner all the main facts and important details connected with the surgical treatment of hernia in the domesticated animals, and my own experience of this condition corroborates in the main what he has set forth.

It is one of the oldest conditions which have ever been met, and I do not think that we have much which is new to bring up, over and beyond the methods adopted by our forefathers.

In fact, it is one of the few diseases in which, in so far as the larger animals are concerned, especially the horse, the advances made by the possibilities of antiseptic surgery have not been so generally applicable. That is to say, and I think that those who have had large experience with hernia operations will agree with me, the old-fashioned and well-tried methods of operating for this complaint have held their own in a remarkable way and are still carried out in spite of attempts to discard and revolutionise them.

One could not have a better illustration of this than the way the method of clamping without cutting through the skin is still retained in hernias of the larger animals in preference to the cleaner and more surgical method of the scalpel and subsequent suture, the reason being that in them the weight of the intestinal organs and the pressure put upon an incised abdominal wall make one chary about running risks of sutures giving way and subsequent eventration.

Personally, I detest the use of the clamp every time I put it on, for it is in a way barbarous and contrary to all ideas of modern surgery, but in by far the larger proportion of cases I prefer to use it, for the simple reason that experience has taught me that it offers a measure of safety much higher than the others; and, after all, the words "safety first," which we see now-a-days posted in so many places, must take the first place, as it is of no use to do a skilful and clever operation with the sequel that the patient died in consequence.

Hernias in animals, in my opinion, when present, should first be considered by the veterinary adviser from two special points of view: first, the danger they are likely to cause, if left untouched, to the life of the patient, and, secondly, their amount of interference with the animal's utility.

Then one should keep in mind the question of heredity and the result of the propagation of its species by the affected one and, lastly, the appearance, considered as an eye-sore.

As regards the danger they are likely to cause, if left untouched, to the life of the patient, one cannot take a better illustration than the scrotal hernia of the young foal, a photograph of which I have here. My own experience of surgical operative interference in the young foal has taught me that it is not a wise procedure, and that it is better not to be adopted unless absolutely necessary. In the first place, because the hernia will very frequently disappear almost, if not quite, entirely as the colt gets older and stronger, particularly if put back daily as often as possible by an intelligent man; and, secondly, because the tissues of the colt are so tender that the clamp or sutures are apt to give way with eventration of the bowels as a consequence.

Against that one has to think that the danger of delay may involve the risk of strangulation, and for that reason one is often forced to operate when one would otherwise refrain. Such was the case in one of the photographs here, and the more one has experience of surgical treatment in these cases the less one likes it. Better, if possible, to wait until the colt is well over twelve months old and the tissues are tougher and stronger.

In the smaller animals things are different, as the amount of strain put upon the tissues is not comparable with that in the horse, and a young dog or a young pig may be operated upon with much greater facility and much less risk. In fact, the latter animal is done almost daily even by the ordinary castrator, the higher situation of the scrotum being a much more favourable one than that of the horse or even of the dog.

The question of heredity is a very important one, and I do not think that Professor Reynolds has sufficiently explained this point. My own opinion is that it is so hereditary that no animal which even comes out of a strain in which hernia is known to exist should ever be bred from, and that at least 90 per cent. of the hernias which exist in animals, both of the large and small varieties, can be traced to heredity. It is one of the most hereditary defects we have, and is capable of missing a generation and yet being passed on through the strain broadcast.

The case that Professor Reynolds relates in which a large proportion of the colts on a certain farm were found to be affected with inguinal hernia at birth, and the argument propounded that the force used to drag away the colt before the mare was absolutely ready may have been the cause of this, is very interesting and quite feasible, but I do not think that too much emphasis can be placed upon the hereditary tendency of a sire or dam with the defect to transmit it on.

However clever an operator may be, and this photograph of a ram with an enormous scrotal hernia (operated upon very skilfully by Professor Imrie and sent back to the stud) well illustrates my remarks, it is questionable whether we as veterinary advisers on the eugenic side of animal life would not be adopting a wiser course in performing castration or ovariotomy freely in all cases of hernia, and thus adding another encouragement for the plan of breeding only from healthy stock.

Professor Imrie is here to-day, and will, I hope, describe the operation he performed upon the ram and tell us what the results have been, for it was a very delicate and skilful one, and resulted in the saving of the testicle as well as the reduction of the hernia.

Some hernias are, of course, quite impossible, and the photograph I have here of a very large ventral hernia in a mare is an illustration of this. Curiously enough, although she looks as if it ought to have been a physical impossibility for her to bring forth her foal, the event came off without the slightest difficulty.

Treatment in all, in principle, is the same—the object being the return of the hernial contents to their normal position in the body, and the firm repair of the external and internal walls.

Professor Reynolds has gone into each individual one in detail, and you have had the opportunity yesterday of seeing that his practical skill in the carrying out of the details of a hernia operation is equal to the lucid way in which he has described each variety.

Trusses in my hands have not been very successful either in horse or dog, but I know some practitioners who speak of them favourably. Of the treatment by irritants I prefer the old-fashioned blister to the use of the acid, and although I agree with Professor Reynolds that they are somewhat of the "hit or miss" type of surgery, I have seen some good results follow the application of this method of treatment.

In small dogs of breeds which take kindly to it (I refer especially to the Pekingese, in which hernia is very common) an umbilical, and even a scrotal or an inguinal, hernia can often be cured by the simple expedient of training the little animal to lie on its back on one's lap for an hour or more at a time. This I have often seen tried with success, and it is always worth a trial in cases where the owner is willing to give the trouble and able to spare the time.

Inguinal hernia in the bitch is serious in the event of pregnancy, and on more than one occasion I have had conditions arise which have necessitated the removal of one or both the pregnant horns through the inguinal sac, strangulation having ensued. As a rule, the patient does well afterwards, for they tolerate interference with the uterus in this situation just as well as when it is operated upon from within the abdomen.

In regard to the use of the ligature instead of the clamp, my opinion agrees with that of the essayist in so far as the horse is concerned; for the dog it is unquestionably the best, but for the larger animals one goes back to the clamp as being decidedly the superior.

There is one question in regard to the clamp upon which I should like Professor Reynolds' personal experience; it is as to whether he has found the steel or the wooden clamp the safer for the scrotal hernia of colts, and whether he has ever had any serious accident with either owing to it having come off too soon? Then, again, in regard to perineal hernia, I should like to know whether he has ever actually successfully operated upon one of these in the dog? My own experience has taught me that permanent reduction of the condition is very difficult, not so much from the operative point of view as from the trouble in getting it to keep in place and not relapse. The situation is not a very favourable one.

Lastly, I think some allusion should have been made to the conditions which are apt to be compared with hernia, such, for example, as the hæmatoma in the foxhound we saw yesterday—abscess, etc., for to those who are only seeing these cases occasionally they are apt to be confusing, and all of us should bear them in mind and ponder them over before arriving definitely at a diagnosis.

General Sir L. J. Blenkinsop said there was only one remark that he had tomake on the paper—a very excellent paper—by Professor Reynolds, that was, he did not know whether he had tried, after operation for scrotal hernia, placing the horse's fore feet down and raising the hind feet. In India 30 years ago, when he went out, they had a large number of horses with scrotal hernia, which was quite common. They generally found, if they got them in the early stages, they could reduce the hernia under chloroform. They did not castrate horses, they tied a handkerchief between the two cords and used to place the animal with the fore legs down in the pit and raise the hind legs. This they found was of great advantage.

The Reply.

Professor Reynolds said he wished first of all to thank Major Hobday for opening the discussion on the paper, for the way he had dealt with it, and for his kind remarks. He did hope that it would have led to much more discussion. It was not encouraging people to go to the trouble of writing papers if they were not discussed more. He did not know why it should not have been discussed more. Surely it could not be that they were frightened. He wished to have got something out of them. Surely some of them had had longer experience than himself, and he would have liked to have had the benefit of it. He made these remarks in a friendly spirit.

Major Hobday said in connection with operations for hernia that the advancement in surgery, aseptic and antiseptic, had not led to any very great improvement in treatment; and they still had to fall back upon the methods adopted by their forefathers. Well, of course, in connection with the large animals like the horse that was absolutely true. But he must say in connection with the small animals he entirely dis-

agreed with him, where the improvement in surgical methods, aseptic and antiseptic, had enabled them to adopt methods that they would not have dared to have adopted otherwise. To stress his point he would refer to the operation the previous day on the Pekingese dog. That could not be done successfully if not according to the latest teachings of surgery. Regarding scrotal hernia in foals, they should not, if possible, be interfered with until the animal was eighteen months or two years. In the majority of cases the hernia would disappear spontaneously. This, of course, did not apply where there was strangulation. Major Hobday and himself were apparently in agreement on the question of heredity. On his part he thought some of the members would have expressed an opinion. Because, although he had not said definitely in the paper that he did not agree with the opinion that was being put forward that heredity played a considerable part in hernia, still his remarks certainly suggested it. He did not say that it played no part in connection with hernia, but he did say that from his own experience that it did not play the important part that some people seemed to think. That was only, of course, an expression of opinion. There was no proof which side was right. But he was convinced that in many cases where apparently one could get some evidence that heredity did play a part, and where the particular line of animals suggested that it was a predisposing factor, they could find there was a cause. What had helped this idea of heredity being a predisposing factor was that hernia was found in young animals that had occurred at birth or shortly afterwards. But if they went thoroughly into many instances and found out all the information about the cases, that would negative heredity as a very important pre-disposing factor. Major Hobday asked if he had a preference for the metal or wooden clamp. He thought there was no question as to which was better, viz.. the wooden clamp. The great advantage was they were much lighter and had not a tendency to break away. He admitted that he did not go into differential diagnosis. He confined his remarks simply to mentioning the diagnosis of hernia. General Blenkinsop's reference was to the employment in the treatment of scrotal hernia of a method that he had referred to in the paper on the treatment of ventral hernia. Cases like this occurred in the country, and one could not readily come to a very definite diagnosis. If there was a large swelling, they must always suspect hernia. Such cases should be treated in this fixed position by placing the hind legs very much higher than the fore legs. It was the first time he had heard of it being employed in cases of scrotal hernia, and it was a very important piece of information. It was certainly worth remembering and acting upon, especially in cases of stallions where one wished to save the testicle.

Mr. SCOTT asked, in the case of a dog with scrotal hernia, whether the testicle instead of being removed could be returned to the abdominal cavity, and if it would afterwards serve a bitch.

Professor REYNOLDS: It would increase sexual desire, but the testicle would be useless. One would have some difficulty in returning it unless there was a large inguinal ring. They would have to enlarge the ring, and that, of course, would be rather a complicated operation, although it would be quite possible.

Canadian Cattle Embargo.

CONFERENCE IN LONDON.

The Colonial Office makes the following announcement, says the *Times* of September 13th :—

His Majesty's Government have been considering the steps to be taken to give effect to the resolutions adopted by the House of Commons on July 24th, and by the House of Lords on July 26th, regarding the admission of Canadian cattle.

They have been in communication with the Canadian Government, and it has been arranged to hold a Conference of representatives of the two Governments in London at an early date. It is hoped that as the result of the Conference it will be possible to arrive at a basis of agreement which could be embodied in a Bill to be introduced into Parliament during the autumn session. It is expected that the Canadian representatives will reach London towards the end of September.

*** The resolution of the House of Commons was as follows :—

> That this House is of opinion that the time has arrived when the embargo on the importation of Canadian cattle should be removed.

It was moved by Captain Shaw (Forfar, C.U.) and carried by 247 votes to 171—a majority of 76. In the debate Sir A. Griffith-Boscawen, Minister of Agriculture, said that he could take no other course than to vote against the resolution.

The House of Lords resolution, which was carried without a division, was in the following terms :—

> That this House accepts the conclusions of the Royal Commission that the Dominion of Canada is free from cattle plague, pleuro-pneumonia, and foot-and-mouth disease, and is of opinion that steers from the Dominion might be admitted as store cattle to Great Britain subject to precautions by means of quarantine being taken.

The resolution, which was moved by Lord Long, was the result of a compromise suggested by Lord Harris in the course of a debate raised some days earlier by Lord Chaplin, who moved a resolution declining to remove the embargo.

In Memoriam.

MALCOLM.—In loving memory of my dear husband, John Malcolm, F.R.C.V.S., late Veterinary Superintendent, Birmingham. Died September 23rd, 1920.

Association Reports.

The North Midland Veterinary Association.

A meeting of the above Association was held on Tuesday, August 22nd, 1922, at Lodge Farm, Worksop, the home of the President, T. Bowett, Esq., M.R.C.V.S. Those present included T. Bowett, Worksop; W. Collinson, Anston; G. J. Furness, Alfreton; R. Hudson, Retford; S. Ludlow, Mansfield; W. Brown, Worksop; M. Robinson, Barnsley; S. E. Sampson, Tom C. Fletcher, S. H. Nixon, H. Thompson, H. L. Torrance and C. H. Ducksbury, all of Sheffield. *Visitors*:—A. Grimes and R. Hudson, junr.

The meeting partook of the nature of a summer outing combined with a series of instructive operations performed by members of the Association, and was in modified form a replica of the Bath operation day.

Mr. S. E. Sampson showed the method of caponing cockerels.

Mr. R. Hudson castrated a seven-year-old entire Shire horse, standing, by the hot-iron method and the use of cocaine locally. The ease with which the operation was performed and the complete absence of pain were remarkable features.

Mr. R. Hudson next undertook the removal of the whole of the mammary gland of a cow. The animal being cast and chloroform administered, a long incision was made through the skin on the then uppermost side of the udder; careful dissection was necessary until major arteries were detected and ligatured. The animal was then turned over and the same procedure adopted. The striking feature to the onlookers was the ease with which the connective tissue that held the mammary gland to the body of the animal was broken down. There was no excessive bleeding, due to the careful finding of the large arteries and ligaturing them before dividing. The great length of the wound necessitated a good many sutures, and in the opinion of the members the incision through the skin should have been closer to the abdomen of the animal, to avoid the abnormal sagging of the skin when the animal rose.

Mr. Herbert Thompson demonstrated the dressing and packing of a cankered foot on the plan adopted by Mr. Pillers—the pure carbolic acid being painted upon the diseased portions, and iodoform dusting powder applied. Mr. Thompson holds that a thin pledget of cotton wool saturated with the acid should be placed in the cleft of the frog and between the frog and sole when the disease exists there, before any rolls are applied to those parts. The heel cross-piece of hoop iron is always a difficult one to keep in position whilst the animal is working unless a nail hole is driven through the heel of the flat shoe, and also through the cross-piece. Mr. Thompson sometimes adopts the principle of having a small calkin to the shoe, and having the cross-piece so long that the ends will turn over, grip the shoe and meet in the centre of the foot.

Mr. T. Bowett demonstrated the inter-tracheal injection of lambs.

Mr. S. E. Sampson showed the application of the Burdizzi castrator on a bull calf.

By the kindness of the President, the members and visitors were invited to lunch and tea. After tea, Mr. T. C. Fletcher, in a few well-chosen words, proposed a vote of thanks to the host and hostess for their hospitality. The President, in his reply, referred to the absence of the Honorary Secretary of the Association, Mr. J. S. Lloyd, owing to ill-health, and expressed a wish for his speedy recovery.

J. S. Lloyd, *Hon. Sec.*

Correspondence.

Letters to the Editor should reach the Office not later than by the first post on Tuesday morning for insertion in following Saturday's issue.

All correspondence must bear the name and address of the contributor for publication.

The Editor does not hold himself responsible for the opinions of his correspondents.

The National Association and Veterinary Inspectors.

Sir,—I am glad to see that Mr. Trevor Spencer has now set out in the issue of August 26th of the *Veterinary Record* an account of the trust he held as Hon. Secretary to the N.A.V.I.

No doubt Mr. Trevor Spencer has given much time to this matter, and we are all indebted to him for his work, and I personally take this opportunity of thanking him for it.

However, having voluntarily taken on the work and become the mouthpiece of the inspectors, they naturally like to hear the result of the negotiations, which, until the appearance of Mr. Spencer's letter, was known perhaps to only a chosen few.

The Mid-West and S. Wales Veterinary Medical Association, which covers Somerset, did discuss the matter, and Mr. Scott, of Bridgwater, kindly lent his good offices to further it. However, it was felt that it would be a mistake to deal locally with it, and most likely interfere in the negotiations which Mr. Spencer then had with the County Council Association when the Somerset C.C. declined to raise our fees.

We, therefore, anxiously waited to hear, but heard nothing until this letter. The result of Mr. Spencer's efforts with the C.C. Association are so far a failure. It is a pity. But now we know definitely how matters stand, which, until the 20th August, we did not.

As a kind of apology for the somnolence of the N.A.V.I., Mr. Spencer points out that the Tuberculosis Order for 1913 is not now in force, and I suppose he would agree that the Milk and Dairies Act has again been postponed.

Now, personally, I see great danger in looking at the matter from that point of view. We should endeavour to get the matter of mileage and fees settled *before* these Acts come into force, and are, I believe, more likely to get our fees accepted now than when the Acts are in operation. When they do come into force with fees as they are at present in many counties, the mileage question alone will be a very serious matter. We all now have an *actual loss* on a few journeys, and we hardly notice them; but multiplied, it will become acute. At present the entire cost to the County Councils will be practically *nil*. When the Acts are in force these costs will become quite material, and we shall meet with greater opposition, from an economic standpoint.

Mr. Spencer alludes to the question of whole-time veterinary inspection, and seems to think that the suggestion of this would act as a terrible spectre to anyone suggesting militant action. If whole-time inspection is coming, it will not come through any influence such as Mr. Spencer suggests. It is an economic matter, but the costs will be huge as compared with our small, but just, demands. We must, I contend, again push our claims politely but firmly, and, if no notice is taken, simply advise the various County Councils what our fees (and mileage allowances the same as licensed vehicles) are, and that we cannot act for less.—Yours truly, W. S. Stevens. Wicanton.

Pasteur Commemoration Fund.

Sir,—I have to inform you that a sum of £848 14s. 6d. has been subscribed to the above Fund. This amount is in addition to sums which had previously been sent to France in response to earlier and direct appeals.

In accordance with a resolution passed at a recent meeting of the Pasteur Commemoration Committee, presided over by Sir Charles Sherrington, a draft for the above amount is being forwarded to Monsieur Hering, the General Treasurer, with an intimation that should the amount prove more than the French Committee desire to expend upon the monument, the excess should be devoted to some other form of permanent memorial of Pasteur in the University of Strasbourg.

On behalf of the Committee, I desire to take this opportunity of thanking you for your assistance.—Yours faithfully, A. CHASTON CHAPMAN, *Treasurer and Secretary.*

Chemical Laboratories,
8 Duke Street, Aldgate, E.C.3, *August*, 1922.

A Correction.

Sir,—In *The Veterinary Record* of the issue of September 9th, page 679, I am credited with having written a paper or made statements on "The Leucocytic Content of Milk" at a conference at Leeds. I have a letter from Mr. Young stating that he has been incorrectly reported, and that he did not quote my name in the discussion.—Yours faithfully, BRENNAN DE VINE.

City of Birmingham Veterinary Department, Holliday Street Wharf, September 12th, 1922.

Obituary.

MR. JOHN BUSCOMB, J.P., CHAIRMAN OF STROUD URBAN COUNCIL.

"It is with genuine regret," says the *Cheltenham Chronicle* of Sept. 9th, "that we have to record the death of Mr. John Buscomb; a regret that will be shared by Stroud folk generally and by others throughout the Mid-Gloucestershire Division and further afield, for he was known far and wide. Fourteen weeks ago he was taken with the illness which terminated fatally. He visited Painswick on Whit-Monday and spent a pleasant hour on the bowling green of the Falcon Hotel. Unfortunately, he contracted a chill which necessitated his keeping to his bed the next day. Then complications arose, and despite all that the best medical skill and the most devoted nursing could do, he began rapidly to fail, and lapsed into semi-consciousness, and passed away peacefully at his residence in Lansdown, on Tuesday morning, at 7-30.

"Mr. Buscomb was a member of the Royal College of Veterinary Surgeons, and he was a native of Bodmin, in Cornwall. He loved the county of his birth and the people belonging to it, and whenever a break in his busy career was possible, he journeyed there for his holiday. It was, he declared, the best tonic he could have, and he always returned re-invigorated and appreciating more fully the somewhat different beauties of the county of his adoption. He first came to Stroud in 1883, taking over the practice of Mr. Millar, who had earlier acquired it from Mr. Powell. He quickly settled down in his new work and gained many friends and clients, who soon learned to value his undoubted ability and his kindly nature. Than he a kinder or more humane man never lived. In treating an animal, from a horse to a cat or tame mouse even, he would use nothing but the best of drugs and the most efficient of instruments. He only considered the comfort of his patients, and the strenuous life he led, travelling at all hours of the night and day and in all winds and weathers, doubtless played a part in the undoing of an otherwise robust constitution. In stature and in nature the doctor was a typical 'John Bull.' He was not only an Englishman, but a man, and he was beloved by all who knew him. Judging his fellows by his own standard, he never thought of anyone doing anything but a manly action. In all things he was generous to a fault, and he was never happier than when contributing to the happiness of others, either humane or of the dumb creation. His horses and dogs were ever his companions, and there at all times seemed a complete understanding between them. Appeals for help in cases of suffering or distress were never made to him in vain.

"When he first came to Stroud he found an old-fashioned country town, and he took his share in the many alterations and improvements which have been effected, and placed the capital of Mid-Gloucestershire on a higher plane as a centre of commerce and industry. His own residence and surgery were old-world in every detail, and occupied the site of the National Provincial Bank in George and Russell Streets prior to his removal to Lansdown. Near his new home he established an up-to-date hospital for the dumb friends who came under his charge, and he also planned an old style garden, in which he evinced the greatest pride. It was in 1907 that he was elected a member of the Stroud Urban Council, and on all the committees of that body he served with credit to himself and distinct satisfaction to the ratepayers and his colleagues. There are to-day only four other members of the Council elected at the same time. Last year he was elected vice-chairman, and in April of the present year he was appointed to the Chair, a well-deserved honour which he much appreciated. This office gave him the right to sit as an *ex-officio* Justice of the Peace, and he was welcomed by the chairman of the Stroud Bench (Col. W. Capel) soon after appointment. Much to his regret that was the only occasion upon which he was able to attend the Court. So conscientious was he in the performance of his public duties and the details of his practice that in the early days of his illness enforced confinement to the house greatly upset him. Mr. H. E Trinder (vice-chairman of the Council) was, however, able to assure him that all was well so far as town affairs were concerned, while as to his practice that was being efficiently carried on by his partner, Mr. Thomas Josiah Margarson, of Mundford, Norfolk, who had come down to assume the responsibility attaching to a very extensive connection. Not only had Dr. Buscomb a big practice of his own in this county, but he was one of the selected veterinary officers under the Board of Agriculture, and his duties in this connection took him great distances in different parts of the country.

"The deceased was a Freemason, and with his life-long friend, the late Mr. William Knee, he founded the Hicks Beach Lodge, of which he was a Past Master. He always evinced the keenest possible interest in the craft, and was much esteemed by the Brethren wherever he was known. He was a staunch Conservative, but by no means an aggressive politician. Some of the exciting political history of Stroud he was associated with, but his record was free from anything to which exception could be taken by his hottest opponent. He was a loyal Churchman; in fact, he was a man of deep, if unobtrusive, religious feeling, and he was for some years a sidesman of Stroud Parish Church.

"Dr. Buscomb, who would have been 62 years of age had he lived until next month, was married in 1889 to Miss Hands, a cousin of the late Mr. and Mrs. William Knee. There was no issue of the marriage. Sincere sympathy is extended to the widow in her heavy bereavement His chief recreation was shooting."

Army Veterinary Service.

TERRITORIAL VETERINARY SERVICES

A Royal Warrant provides that the rate of pay for a Deputy Assistant Director of Veterinary Services in the Territorial Army shall be £150 a year instead of £375 a year Bonus on the £150 a year, as provided by current rates, will be issuable in addition, and officers in receipt of retired pay filling this post will continue to draw retired pay in addition to these emoluments—*The Times.*